01-27-00

EXPRESS MAIL NO.
EL514455399US

Docket No. 85A 2915
Date: January 24, 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

Transmitted herewith for filing is the patent application for inventor(s):
KOJI SATO of Akishima, Japan

For: GUIDE RAILS FOR CONVEYING BAND-FORM MEMBERS

Also enclosed are:

3 sheet(s) of drawings	X
Certified copy of Japanese Patent Application No. 11-13831 of January 22, 1999 upon which Convention Priority is claimed	X
Declaration and Power of Attorney	X
Verified Statement Claiming Small Entity Status	X
Information Disclosure Statement (Form PTO/SB/08A)	X
Assignment of the invention to KABUSHIKI KAISHA SHINKAWA	X

For	No. Filed	No. Extra			Basic Fee $690/$345
Total Claims	2 - 20	0	X	$ 18/$ 9	$ 0
Independent Claims	1 - 3	0	X	$ 78/$ 39	$ 0
Multiple Dependent Claims				$260/$130	$ 0
Total Filing Fee					$ 345.00

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. 11-1445. A duplicate copy of this sheet is enclosed.

A check in the amount of $345.00 to cover the filing fee is enclosed. X

A check in the amount of $40.00 to cover the recordation of assignment is enclosed. X

Respectfully submitted,

KODA & ANDROLIA

By: _____
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KODA & ANDROLIA
USA
SMALL BUSINESS

Applicant or Patentee: Koji Sato
Serial or Patent No.: _____ Attorney's Docket No.: 85A 2915
Filed or Issued: _____
For: Guide Rails for Conveying Band-Form Members

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9 (f) and 1.27 (c)) — SMALL BUSINESS CONCERN

I hereby declare that I am

[ ] the owner of the small business concern identified below:
[X] an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN KABUSHIKI KAISHA SHINKAWA
ADDRESS OF CONCERN 2-51-1, Inadaira, Musashi Murayama-shi
Tokyo, Japan

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9 (d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled GUIDE RAILS FOR CONVEYING BAND-FORM MEMBERS by inventor(s) KOJI SATO described in

[X] the specification filed herewith
[ ] application serial no. _____, filed _____.
[ ] patent no. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9 (d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

NAME _____
ADDRESS _____
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING KENJI FUJIYAMA
TITLE OF PERSON OTHER THAN OWNER President
ADDRESS OF PERSON SIGNING 2-51-1, Inadaira, Musashi Murayama-shi
Tokyo, Japan

SIGNATURE _____ DATE 01/20/2000

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Dated: Jan. 24, 2000 By: [signature]

85A 2915 SHINKAWA

Inventor: KOJI SATO

For: GUIDE RAILS FOR CONVEYING BAND-FORM MEMBERS

GUIDE RAILS FOR CONVEYING BAND-FORM MEMBERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to guide rails used in a semiconductor manufacturing apparatus for conveying band-form members such as a film carrier tape.

2. Prior Art

Typical band-form member conveying guide rails used in a semiconductor manufacturing apparatus have a structure as shown in Figure 3.

In this guide rail structure, a pair of guide rails 2A and 2B that guide both side portions of a band-form member 1 are installed so as to face each other. The guide rails 2A and 2B consist of rail main bodies 3A and 3B and vertical-direction guide plates 4A and 4B. The vertical-direction guide plates 4A and 4B are fastened to the upper surfaces of the rail main bodies 3A and 3B so as to form guide grooves 5A and 5B between the rail main bodies 3A and 3B and vertical-direction guide plates 4A and 4B, thus guiding the band-form members 1 in the vertical direction.

Guide rails 2A and 2B of this type are disclosed in, for instance, Japanese Patent Application Publication (Kokoku) No. H2-54664. In this prior art, a pair of guide rails are provided with upper plates with guide grooves in between.

In these conventional band-form member conveying guide rails, the band-form member 1 is conveyed while the entire upper and lower surfaces of both side portions of the band-form member 1 are regulated in the vertical direction by the guide grooves 5A and 5B that are formed by the rail main bodies 3A and 3B and vertical-direction guide plates 4A and 4B. Accordingly, the frictional resistance during the conveyance tends to be large. In particular, when the band-form member 1 is a film carrier tape, the thickness is as thin as 25 to 125 μm, and it is flexible. Thus, undulation and twisting, etc. would occur during the conveying process. As a result of such

undulation and twisting, etc., the frictional resistance of the upper and lower surfaces of side portions of the tab tape against the guide grooves 5A and 5B increases, and problems such as shape deformation of the tab tape and damage to the tab tape, etc. occur. In cases where the band-form member 1 is a lead frame, undulation and twisting, etc. would not occur; however, when the frictional resistance is high, the motive power of the conveying power supply needs to be increased.

Furthermore, when some type of trouble occurs during the conveying of the band-form member 1, the conveyance must be stopped so as to remove the band-form member 1 from the guide grooves 5A and 5B. However, since the guide grooves 5A and 5B of the prior art are in a continuous form, it is difficult to remove the band-form member 1 out of these guide grooves 5A and 5B.

SUMMARY OF THE INVENTION

Accordingly, the object of the present invention is to provide band-form member conveying guide rails in which the frictional resistance is reduced, and band-form members can easily be removed from the guide assemblies.

The above object is accomplished by a unique structure of a band-form member conveying guide rails that comprise a pair of guide rails disposed facing each other so as to guide both side portions of a band-form member, and each of the guide rails is comprised of a rail main body and a plurality of guide assemblies, in which the guide assemblies are spacedly installed on the upper surface of the rail main body so that they can guide a part of the upper surface of the band-form member.

In this structure, each of the guide assemblies are comprised of a width-direction guide element and a vertical-direction guide element; and the width-direction guide element is fastened to the rail main body at fixed intervals in the conveying direction of the band-form member so as to guide the band-form member in the width direction, and the vertical-direction guide element is disposed on the width-direction guide element so as to guide the band-form member in the vertical direction.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1(a) is a perspective view of the first embodiment of the band-form member conveying guide rails according to the present invention, and Figure 1(b) is a view taken from the conveying direction;

Figure 2(a) is a perspective view of the second embodiment of the band-form member conveying guide rails according to the present invention, and Figure 2(b) is a view taken from the conveying direction; and

Figure 3(a) is a perspective view of a conventional example of band-form member conveying guide rails, and Figure 3(b) is a view taken from the conveying direction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A first embodiment of the present invention will be described with reference to Figure 1.

A pair of guide rails 10A and 10B are installed facing each other so as to guide both sides portions of a band-form member 1, which is, for instance, a film carrier tape which has some degree of flexibility. The guide rails 10A and 10B comprise rail main bodies 11A and 11B and a plurality of guide assemblies 12A and 12B.

The guide assemblies 12A and 12B are provided on the upper surfaces of the rail main bodies 11A and 11B along the conveying direction of the band-form member 1 indicated by an arrow C or in the length-wise direction of the rail main bodies 11A and 11B. The guide assemblies 12A and 12B are comprised of shaft members 13A and 13B and flange members 14A and 14B. The shaft members 13A and 13B are provided so as to act as a width-direction guide that guides the band-form member 1 in the direction of width (shown by arrow W); and the flange members 14A and 14B are provided so as to act as a vertical-direction guide that guides the band-form members 1 in the vertical direction (shown by arrow V). In this embodiment, the shaft members 13A and 13B are cylindrical pillars having heights greater than the thickness of the band-from member 1 to be conveyed, and the flange members 14A and 14B are circular plates

having a larger diameter than the shaft members 13A and 13B and installed on the tops of the shaft members 13A and 13B in a coaxial fashion.

Accordingly, the band-form member 1 is conveyed while being regulated in the vertical direction by the spaces between the upper surfaces of the rail main bodies 11A and 11B and the undersurfaces of the flange members 14A and 14B. In this case, the upper surface of the band-form member 1 is partially regulated by the flange members 14A and 14B, in other words, the upper surface of the band-form member 1 is regulated only at points where the upper surface of the band-form member 1 is in contact with the flange members 14A and 1B; and the portions between the guide assemblies 12A and 12B in the conveying direction are not regulated. Accordingly, the frictional resistance during conveying is alleviated, deformation and damage, etc. is less likely occur in the band-form member 1, and only a small conveying power supply is required.

When some type of trouble occurs during the conveying process of the band-form member 1, it is necessary to stop the conveying and take out the band-form member 1 from the surfaces of the rail main bodies 11A and 11B. In this case, according to the present invention, it is only necessary to remove the band-form member 1 from the guide assemblies 12A and 12B. Thus, the band-form member 1 can easily be taken out of the rail main bodies 11A and 11B. Furthermore, after the band-form member 1 has been removed and the trouble has been taken care of, it is necessary merely to insert the band-form member 1 back into the guide assemblies 12A and 12B. Thus, the band-form member 1 can easily be returned to the guide rails 10A and 10B.

Figure 2 illustrates a second embodiment of the present invention.

In this embodiment, instead of the flange members 14A and 14B used in the first embodiment, rollers 21A and 21B are employed. More specifically, the guide assemblies 12A and 12B are comprised of pin shafts 20A and 20B, which are provided on the rail main bodies 11A and 11B, and rollers 21A and 21B, which are installed on these pin shafts 20A and 20B in a rotatable fashion. Like the first embodiment, the pin shafts 20A and 20B are cylindrical pillars having heights greater than the thickness of the band-from member 1 to be conveyed, and the rollers 21A and 21B are circular in shape

with a larger diameter than the pin shafts 20A and 20B and installed on tops of the shaft members 13A and 13B in a coaxial fashion

Accordingly, in this second embodiment, the spaces between the pin shafts 20A and 20B regulate the horizontal movement of the band-form member 1, and the spaces between the upper surfaces of the rail main bodies 11A and 11B and the undersurfaces of the rollers 21A and 21B partially regulate the band-form members 1 in the vertical direction, in the same manner as in the first embodiment. In the second embodiment, the rollers 21A and 21B can rotate and make rolling contact when the band-form member 1 is conveyed. Accordingly, the frictional resistance is reduced even further than in the first embodiment. Furthermore, the band-form member 1 can easily be removed from the guide rails 10A and 10B.

As seen from the above, according to the present invention, the frictional resistance during the conveying process of band-form members is alleviated, and also the band-form members can easily be taken out of the guide assembly.

WHAT IS CLAIMED IS:

1. Guide rails for conveying a band-form member comprising a pair of guide rails that are disposed facing each other so as to guide both sides of a band-form member, wherein said guide rails are comprised of rail main bodies and guide assemblies, said guide assemblies being provided on upper surfaces of said rail main bodies so as to partially guide an upper surface of said band-form member.

2. The guide rails according to Claim 1, wherein said guide assemblies are comprised of width-direction guide elements which are provided on said rail main bodies at fixed intervals in a conveying direction of said band-form member so as to guide said band-form member in a width direction thereof, and vertical-direction guide elements which are provided on said width-direction guide elements so as to guide said band-form member in a vertical direction thereof.

ABSTRACT OF THE DISCLOSURE

Guide rails for guiding a band-form member such as a film carrier tape in a semiconductor manufacturing apparatus comprising a pair of rail main bodies with a plurality of guide assemblies provided on the upper surfaces of the rail main bodies so that the guide assemblies partially guide the upper surface of the band-form member.

FIG. 1(a)

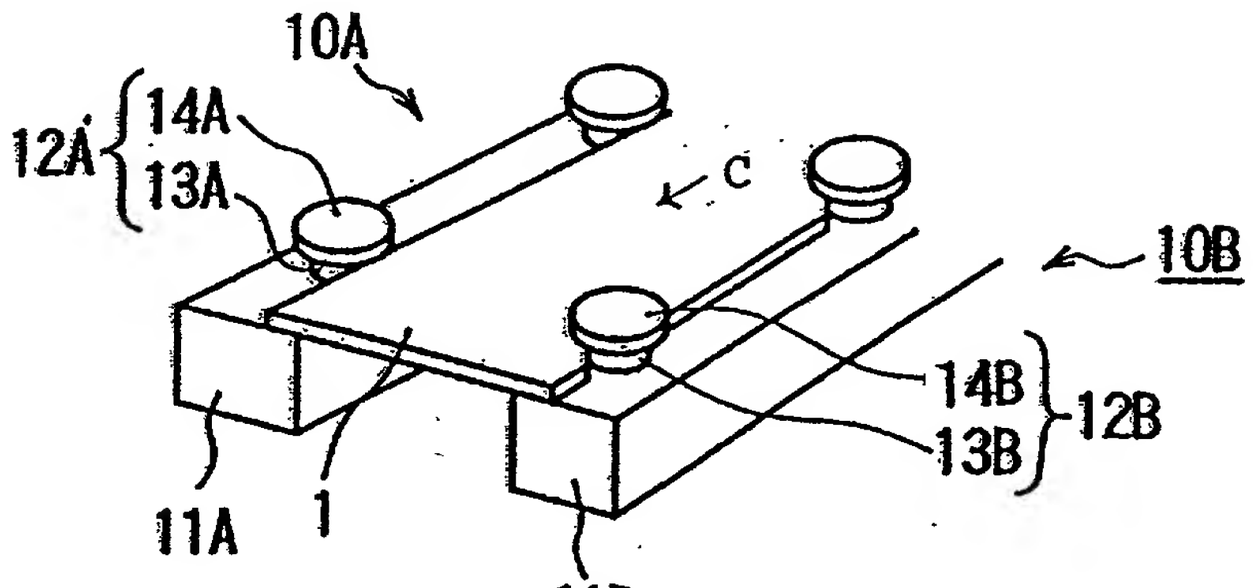

10A
12A
14A
13A
C
10B
14B
13B
12B
11A
1
11B

FIG. 1(b)

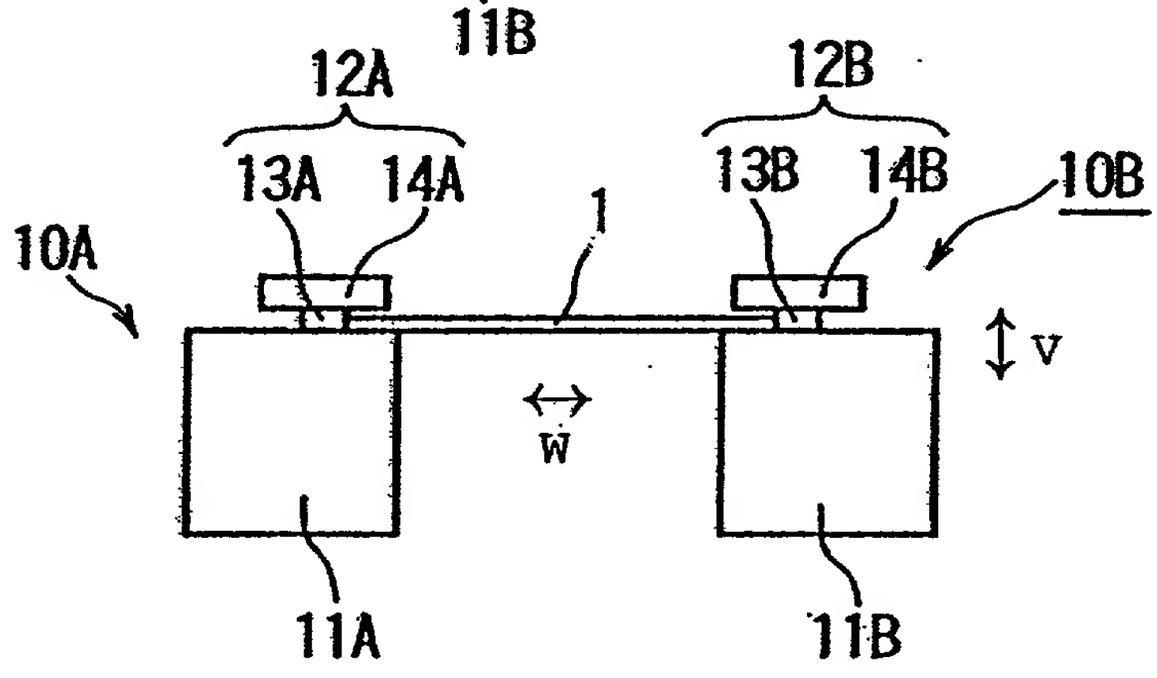

11B
12A
12B
13A
14A
13B
14B
10B
10A
1
V
W
11A
11B

FIG. 2(a)

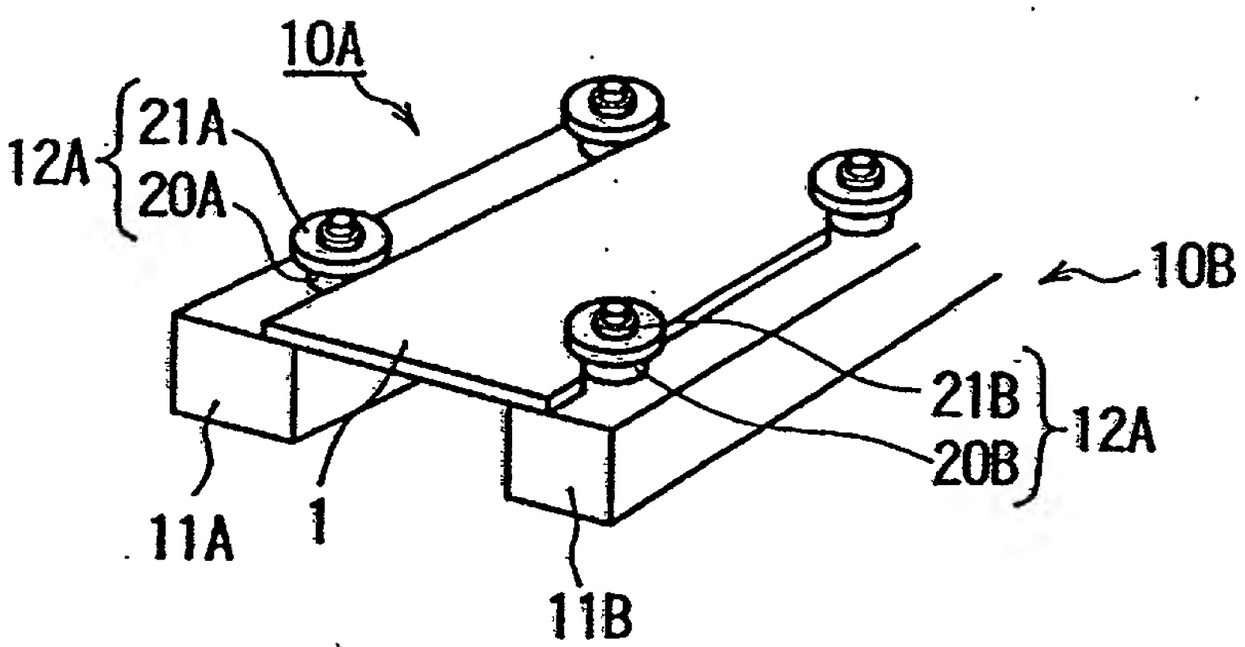

10A
12A
21A
20A
10B
21B
20B
12A
1
11A
11B

FIG. 2(b)

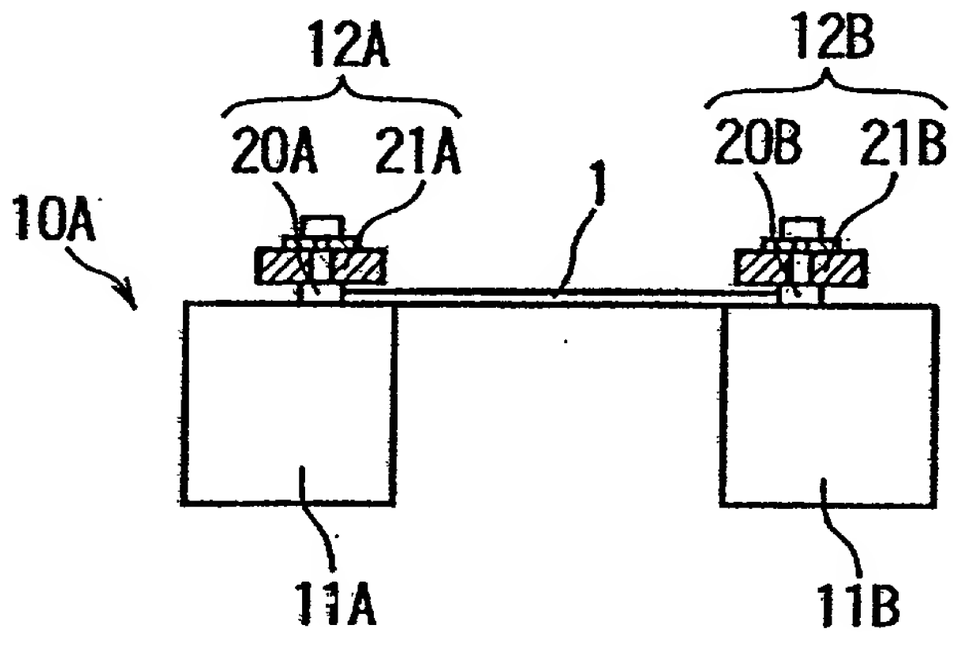

12A
12B
20A
21A
20B
21B
10A
1
11A
11B

FIG. 3(a)
PRIOR ART

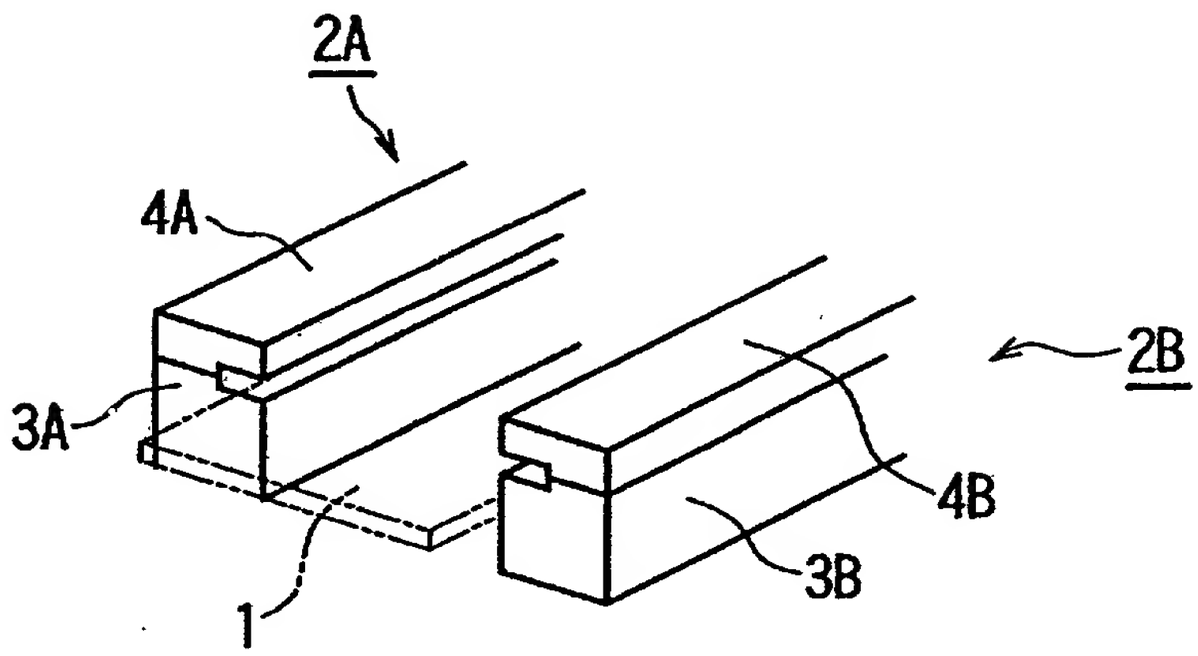
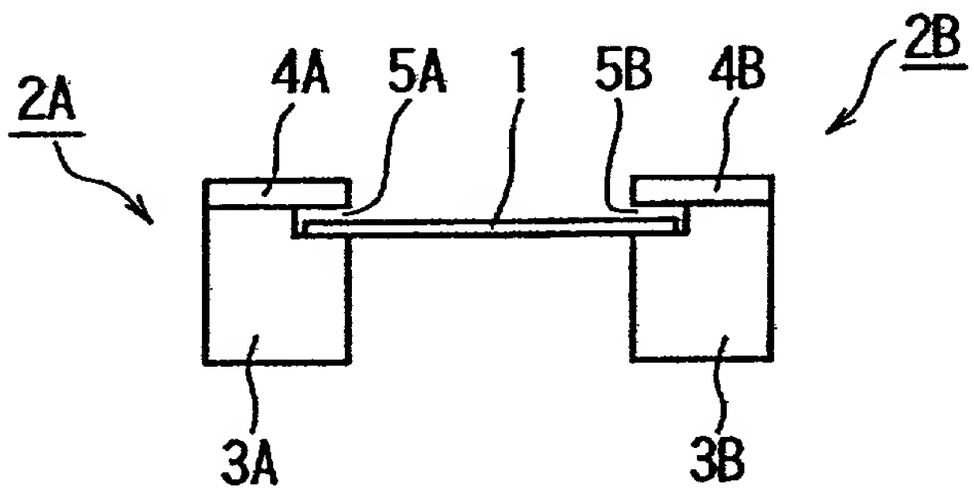


FIG. 3(b)
PRIOR ART



DECLARATION AND POWER OF ATTORNEY

PATENT (U.S.A.)
KODA & ANDROLIA
ATTORNEY'S DOCKET NO.
85A 2915

As a below named inventor, I declare that :

My residence, post office address and citizenship are stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

GUIDE RAILS FOR CONVEYING BAND-FORM MEMBERS

the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____ as United States Application Number or PCT International Application Number _____

and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or Inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the appropriate line, any foreign application for patent or Inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed

PRIOR FOREIGN APPLICATION(S)						
COUNTRY	APPLICATION NUMBER	DATE OF FILING Month	Day	Year	PRIORITY CLAIMED	
Japan	11-13831	01	22	1999	YES X	NO ___
					YES ___	NO ___
					YES ___	NO ___
					YES ___	NO ___

I hereby claim the benefit under 35 U.S.C § 119(e) of any United States provisional application(s) listed below.

APPLICATION NUMBER	FILING DATE

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

APPLICATION NUMBER	FILING DATE	STATUS – PATENTED, PENDING, ABANDONED

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected herewith.
WILLIAM L. ANDROLIA, REG. NO 27,177; H. HENRY KODA, Reg. No 27,729; ALEX CHARTOVE, Reg. No. 31,942.

SEND ALL CORRESPONDENCE TO:	DIRECT TELEPHONE CALLS TO:
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	Post Office Address	5-3-4, Matsubara-cho, Akishima-shi, Tokyo, Japan				CITIZENSHIP Japan
202	Name of Inventor	FIRST NAME	LAST NAME	MIDDLE NAME	Residence CITY	STATE or COUNTRY
	Post Office Address					CITIZENSHIP
203	Name of Inventor	FIRST NAME	LAST NAME	MIDDLE NAME	Residence CITY	STATE or COUNTRY
	Post Office Address					CITIZENSHIP
204	Name of Inventor	FIRST NAME	LAST NAME	MIDDLE NAME	Residence CITY	STATE or COUNTRY
	Post Office Address					CITIZENSHIP

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements and the like may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202
Koji Sato	
DATE 01/20/2000	DATE
SIGNATURE OF INVENTOR 203	SIGNATURE OF INVENTOR 204
DATE	DATE

☐ Additional inventors are named on separate Declarations attached hereto.